

The future — effects of plant disease on society

J T Young

PO Box 54, Walpole WA 6398

Abstract

Just as humans react adversely to too many changes occurring too rapidly, many plant species of the south-west of Western Australia will not withstand the rate of change in their environment. There are many ways in which the structure and composition of plant communities are being drastically altered over large areas. Plant diseases may well express as never before. Disease epidemics may be one of the things which force changes in the way the ecosystems of the south-west are managed and utilized. Management should be based more on basic ecological principles and less on economic considerations. Much greater emphasis should be placed on disease prevention. It must be realised that many systems of disease control developed for horticultural situations are not applicable for broad scale use in natural ecosystems. Once management is more in accordance with basic ecological principles, there will be less conflict in society between those who are fearful for the future health of south-western ecosystems and those who believe "the bush", the forests in particular, will withstand intensive exploitation and repeated disturbance.

If disease prevention does not become a prime objective of management, future generations will get fewer and fewer opportunities to appreciate, exploit and enjoy the great diversity, complexity and beauty of the ecosystems of the south-west, which Europeans discovered less than 200 years ago.

Effects of plant disease on society

Future effects of plant disease on society will be numerous. There are the obvious things; more regulations, more expensive natural products and decreased supply of products previously, all taken for granted. One less-obvious effect will be a greater divergence of management techniques used in natural ecosystems from those used in areas of intensive production such as on farms and in plantations. Plant diseases are difficult and often impossible to control in natural ecosystems; for example the root diseases caused by *Phytophthora cinnamomi* and *Armillaria luteobubalina* can be either prevented or controlled in horticultural situations, but both are almost impossible to control in conservation and forest areas where there are numerous infections spread over vast areas.

The incidence and severity of plant disease in our south-western ecosystems are going to increase and as a consequence the ways of management will be forced to change. There has to be much more emphasis on disease prevention. Society must be much more honest about the long term objectives of management of both the conservation estate and forests. Economic rather than ecological principles are primarily determining how the ecosystems of the South-west are currently being managed. Some plans are initiated from a base of ecological information but then debased by extrapolation over vast areas of widely varying communities; for example jarrah logging prescriptions and the treatment of mixed species Eucalypt forests.

This paper is too short to discuss the factors which favour the development of plant diseases in detail. Shearer (1992)

suggested many ways in which human activity could either aggravate or control disease in forest ecosystems. I believe there is plenty of evidence that disease incidence and severity will increase as a consequence of human activity. Society seems to be doing much more to encourage plant diseases than to prevent or suppress them. Of particular concern to me is the rate of logging in State Forest. Disease prevention seems to be a low priority.

The case for woodchipping and clear-felling is in part based on the ability to regenerate karri forest from seed and seedlings. The ash type eucalypts lend themselves to such management especially when they are in relatively pure stands but there are fewer and fewer stands with predominantly karri available for clear-felling. Much of the forest being treated as karri has few stems of karri per hectare; the rest is marri, blackbutt and jarrah. Much of it is essentially jarrah forest. What is of concern is that karri is being established back on to many areas and soil types where it never grew naturally at high densities. We are imposing a plantation-type system within natural ecosystems without the knowledge or resources to manage disease. The incidence of brown wood and incipient rot is high in regenerated karri stands (Davison & Tay 1994, Shearer 1992). The stability and benefits of mixed species stands are not understood. Across Australia, often a species of the *Eucalyptus* sub-genus *Monocaplytus* and a species of the sub-genus *Symphomyrtus* seem to form stable associations (Boland *et al.* 1984).

The recently approved Forest Management Plan 1994 - 2003 (Conservation and Land Management 1994) for this State will mean that areas of jarrah forest, in the order of 130 km² to 300 km², will be "clear-felled" every year and require ongoing thinning. Many of the areas so treated will be in the low and intermediate rainfall zones of the forest where the quality of forest is mixed and little research has ever been done. The recent past scale of the operations means that there is already something like 4126 km² of regenerating jarrah

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forest, with less than 20 years of growth (figures collated from Forest Department (WA) and Conservation and Land Management Annual Reports).

As stated by the Environmental Protection Authority (1992), the commitment to the type of management described in this paper "would lock the state into long term acceptance of the new forest structure and the new intensive production with insufficient flexibility to adapt management in the light of new information or changes in community expectations". What does happen if, as I predict, diseases hinder regeneration and growth rates do not meet levels set in computer models? I believe that there are already quite inadequate resources to guarantee a healthy crop of trees over all of the areas being logged. Intensive monitoring and disease management seems even less likely.

Forests are slow to grow and conversely they are slow to die. Consequently, mismanagement may take 20 to 40 yrs to express on a large scale. The danger is that economics rather than ecological principles will drive management of forests for too long and signs of decline will be ignored. Unfortunately, a single State Department controls most of our natural ecosystems and one disadvantage of this state of affairs is that "blanket" prescriptions are imposed over vast areas. When mistakes are made, the consequences will be great. In industries where private enterprise flourishes, many ideas are tried on a small scale all the time. Those that are not any good, fail, without great cost to society.

Society must honestly address the question of sustainability and what of the natural ecosystems of the south-west will be left to provide future generations. Multiple use of areas means increasing pressures on the vegetation. The frequency of disturbance, including fires, is ever increasing, presumably resulting in effects such as decreasing numbers of mature seeding plants and decreasing carbohydrate reserves within perennials. How do we measure the potential of different plants and communities to reproduce, recover and resist disease after repeated disturbance? We have few measures of vigour or resistance. Slow and gradual decline of species is also difficult to monitor. The decline of species is often masked by the colonization of bare ground by other species. Even with dieback caused by *P. cinnamomi* few people appreciate the extent and changes in the floristics of plant communities in the south-west because *Agonis* species and rushes have replaced many of the species killed. Surely one of the things about planning for the future is heeding warnings. Warnings can result from monitoring. There has been far too little monitoring done in vast areas of the south-west on dieback or anything else. The effects of disease on regeneration of dominant species should surely be a high priority? What are the effects of *P. cinnamomi* on jarrah regeneration on different soils?

Usually a crisis has to be well documented before politicians will respond. Plant disease epidemics along with insect plagues will help sway society to call for change. At least the conservation estate should be managed in accordance with basic ecological principles. Compromises, a result of too many conflicting pressures, should be sought warily.

I believe that, once ecological principles are the basis of vegetation management, there will be less conflict in society between those who believe, "the more you bash it the better it'll be" and those who do have a degree of understanding of the complexity and vulnerability of the ecosystem of the south-west. At least the forest debate could become less polarised. I believe community expectations of sound management of our natural ecosystems are going to ever increase. In the future, the public will be better educated in environmental biology and as more environmental disasters become apparent their assessment of management practices will be more and more rigorous.

The current education curricula in schools are stressing an understanding of environmental issues such as dieback and salinity. The general level of appreciation of the flora and fauna is increasing and people will be more sensitive to adverse changes brought about by plant disease. When people go out and plant trees in "greening" programmes and they die, some will ask why?

More people will observe and recognise problems as they arise. Society must appreciate the ecosystems on which it impinges, including their complexity and vulnerability; otherwise there will not be the will and determination to minimize the impacts of disease.

References

- Boland DJ, Brooker M I H, Chippendale G M, Hall N, Hyland B P M, Johnston R D, Kleinig D A & Turner J D 1984 Forest Trees of Australia. CSIRO, Nelson.
- Conservation and Land Management 1994 Forest Management Plan 1994 - 2003. Department of Conservation and Land Management, Perth.
- Davison E M & Tay F C S 1994 Incipient rot and rot in regrowth karri. In: Handbook of the symposium on plant diseases in ecosystems: threats and impacts in south-western Australia (ed R T Wills & W A Cowling) Royal Society of Western Australia and the Ecological Society of Australia, Perth, 22.
- Environmental Protection Authority 1992 Proposal to amend the 1987 forest management plans and timber strategy and proposals to meet environmental conditions on the regional plans and the WACAP ERMP. Department of Conservation and Land Management. Report and Recommendations of the Environmental Protection Authority, Perth. Bulletin 652.
- Shearer B L 1992 The ecological implications of disease in the southern forest of south-western Australia. In: Research on the impact of forest management in south-west Western Australia. Department of Conservation and Land Management, Perth. Occasional Paper Number 2/92.